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Frugal Innovation in Crisis Management: A Sustainable Approach to Emerging Markets

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1. Background

"*This crisis (COVID-19), undoubtedly more than any other, requires cooperation, requires the invention of new international solutions.*" These words of the French President Emmanuel Macron, in his address to the United Nations General Assembly on September 22nd, 2020, illustrates the fact that the COVID-19 pandemic highlighted the need for new solutions to solve the disruptions in the global supply chain. Such as scalable, affordable solutions to ensure business continuity amid resource scarcity. Innovations like low-cost ventilators and scalable telehealth services demonstrated the power of adaptability in crisis. Frugal innovation—characterized by cost reduction and resource optimization—has emerged as a sustainable strategy for crisis management, particularly in emerging markets. This paper explores frugal innovation as a viable pathway for resilience, addressing systemic challenges such as limited infrastructure, financial constraints, and limited access to technology (Radjou & Prabhu, 2015).

Frugal innovation aims to deliver high-value, affordable products, particularly in environments with limited resources (Weyrauch & Herstatt, 2017). In this context, 'high-value' refers to products that effectively meet essential needs while maintaining quality and functionality, despite being developed with cost constraints and limited resources. Key components of frugal innovation include a focus on core functionalities, cost reduction, and shared sustainable engagement (Rossetto et al., 2023). The concept of bricolage—"making do with what is at hand"—plays a critical role by enabling creative use of available resources during crises (Baker & Nelson, 2005; Santos et al., 2020).

In emerging markets, bricolage becomes essential due to pronounced constraints, allowing firms to develop solutions that are both cost-effective and relevant. For example, Jaipur Foot, an organization in India, utilized bricolage by employing low-cost materials to produce affordable prosthetic limbs, significantly improving mobility for people in underserved communities. M-Pesa, a mobile payment service in Kenya, is a prime example, providing financial services to millions of unbanked individuals by creatively leveraging existing infrastructure. Global challenges like climate change further magnify frugal innovation's importance, as it promotes affordable renewable energy technologies that reduce greenhouse gas emissions.

2. Frugal innovation is key to tackling multifaceted crises

2.1. Benefits of Frugal Innovation in Crisis

Frugal innovation maximizes value by reducing costs, repurposing materials, and streamlining processes. It maintains affordability while preserving essential quality (Weyrauch & Herstatt, 2017). For instance, during the COVID-19 pandemic, companies developed affordable ventilators using locally available materials, which provided essential support to healthcare systems in low-resource settings. These efforts demonstrated how frugal innovation could adapt and respond effectively in crises (Rossetto et al., 2023). Moreover, the M-Pesa mobile payment system is another example of frugal innovation providing critical services during times of financial instability.

2.2. Bricolage as a Strategic Tool

Bricolage transforms constraints into opportunities by repurposing undervalued resources (Santos et al., 2020). Mitticool, an Indian company, used clay to create low-cost refrigerators, exemplifying bricolage's role in transforming waste materials into functional products. By embracing bricolage, firms can maintain operations even when external resources are limited. For example, during the 2011 Thailand floods, Western Digital used bricolage by repurposing materials and adjusting production processes to maintain operations, enabling them to recover swiftly and continue providing hard drives despite severe disruptions. This example highlights how bricolage can help firms navigate crises by using creative resource management.

2.3. Frugal Innovation a pathway to reach the UN Sustainable Development Goals (SDGs)

Frugal innovation aligns with the UN's Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 12 (Responsible Consumption and Production) (Pisoni et al., 2018). Specifically, frugal innovation supports SDG 1 by providing affordable products and services that help lift people out of poverty, such as the Tata Nano car. It supports SDG 9 by encouraging the development of cost-effective infrastructure, as exemplified by M-Pesa's mobile payment system. Furthermore, it aligns with SDG 12 by promoting responsible production through minimizing resource use, demonstrated by Mitticool's clay refrigerators.

3. Propositions

3.1. Incentivize frugal innovation by targeted subsidies

Governments should incentivize frugal innovation by offering targeted subsidies, such as tax reductions for companies developing affordable and sustainable technologies,

and by creating grants to support small-scale innovators. For example, India's government has provided subsidies for renewable energy projects, encouraging local entrepreneurs to innovate within the renewable sector (Radjou & Prabhu, 2015). Additionally, fostering an ecosystem that encourages creativity under constraints could involve establishing innovation hubs, providing mentorship programs to connect local entrepreneurs with industry experts, and offering regulatory relaxations that make it easier for startups to test and implement frugal solutions.

In the context of budget restrictions nearly everywhere, governments could also or rather create public procurement programs that prioritize frugal innovations. For instance, awarding contracts to companies providing cost-effective, locally designed healthcare or infrastructure solutions can stimulate the demand for frugal innovation and build a thriving ecosystem of affordable solutions. Another practical example is Brazil's support for locally made, low-cost medical devices through preferential procurement policies, which has led to greater resilience in the medical technology sector.

3.2. Incorporate bricolage practices to build resilience

Firms should incorporate bricolage practices to build resilience, utilizing waste materials and locally available resources. Companies can implement training programs to teach bricolage practices to their employees, such as organizing workshops that focus on creative reuse of materials, providing hands-on training in resource optimization, and encouraging cross-departmental collaboration to identify and repurpose underutilized assets. This type of structured training can help employees develop the skills necessary to innovate effectively under constraints. For example, during the COVID-19 pandemic, several companies in Africa used repurposed materials to produce face shields and hand sanitizers, demonstrating the power of bricolage in addressing immediate needs despite resource constraints. Businesses should also establish internal programs to train employees in bricolage techniques, encouraging them to identify and utilize underused resources creatively. For example, promoting cross-functional innovation challenges within organizations can lead to novel solutions derived from existing, overlooked assets.

Another practical strategy is to partner with local communities to better understand available resources and cultural nuances. For example, Unilever's 'Shakti' initiative partnered with women in rural India to distribute products, leveraging their local knowledge to enhance distribution efficiency and create sustainable livelihoods. This collaboration illustrates the value of engaging local communities in co-creating effective and contextually relevant solutions. By leveraging local knowledge, companies can further enhance their bricolage capabilities, creating products that are both relevant and resource-efficient. Mitticool's success in India, where local clay was repurposed into refrigerators for rural areas, highlights how companies can use locally available materials to create contextually appropriate and low-cost innovations.

Firms could also engage in collaborative projects with universities and research centers to further enhance bricolage capabilities. Such collaborations bring in new perspectives, research insights, and technological expertise that help refine and scale up bricolage

practices effectively. For instance, partnerships between tech firms and engineering colleges in developing countries have led to low-cost, functional prototypes addressing local problems, thereby demonstrating the importance of linking academic knowledge with practical, resource-constrained innovation.

Moreover, firms can consider collaborating with local artisans and craftspeople who have extensive knowledge of how to make the most out of limited resources. By integrating traditional craft techniques with modern business practices, firms can co-create innovative, frugal products that are not only functional but also preserve cultural heritage.

Companies can also explore the use of digital platforms to facilitate bricolage. By using online forums and collaborative tools, employees from different geographic locations can share ideas on how to repurpose materials or solve resource-based challenges creatively. This form of digital bricolage expands the potential for innovation beyond physical boundaries and encourages a collective approach to problem-solving.

3.3. A multi-stakeholder approach to enhance sustainability

Partnerships among communities, governments, and businesses are vital for addressing local challenges effectively (Pisoni et al., 2018). For example, the partnership between Coca-Cola and the NGO WaterAid successfully provided clean water access in rural areas of Africa, demonstrating how collaboration can effectively address critical community needs. Collaboration can involve co-creation workshops, which are sessions where community members actively participate in brainstorming, designing, and refining solutions. This ensures that the final product meets local needs and incorporates the knowledge and preferences of the people who will use it. For instance, Grameen Bank in Bangladesh collaborated with local communities to develop microfinance solutions tailored to their specific economic conditions, thus empowering underserved populations.

Companies should also consider partnerships with non-governmental organizations (NGOs) and academic institutions to leverage their expertise in social issues, research, and resource management. This multi-stakeholder approach can enhance the sustainability and scalability of frugal innovations. For example, partnerships between the NGO Barefoot College and solar companies have led to the successful training of rural women as solar engineers, promoting both empowerment and sustainable energy solutions.

Additionally, forming regional innovation clusters can help pool resources and share best practices among firms tackling similar challenges. These clusters can facilitate knowledge transfer, enabling businesses to scale their frugal innovations more effectively. An example of this is Kenya's Konza Technopolis, which acts as an innovation hub where companies, researchers, and government entities collaborate to address infrastructure and technology challenges through cost-effective and sustainable solutions.

4. Conclusion

Frugal innovation is a sustainable pathway for crisis management, particularly in emerging markets, as it focuses on leveraging limited resources effectively. By fostering creativity and collaboration, companies can transform constraints into opportunities for growth. Tata Group's development of the Tata Nano exemplifies how resource constraints can drive impactful, value-driven products, highlighting frugal innovation as a powerful strategy for addressing systemic challenges. Similarly, M-Pesa's success in providing financial inclusion in Kenya demonstrates the potential of frugal innovation to bring transformative societal benefits.

Moreover, frugal innovation not only addresses immediate needs during crises but also aligns with broader goals such as poverty reduction, infrastructure development, and sustainable production. By embracing bricolage, fostering collaborative ecosystems, and implementing strategic government policies, businesses can create resilient solutions that contribute to long-term sustainable development.

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